

## *The Human Right to Sustainable Environment: Emerging Trends*

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# Environmentally Sound Technologies for Climate Change Mitigation in BRICS Countries: A Comparative Policy and Legal Perspective

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**Abstract.** The adoption of environmentally sound technologies (ESTs), with potential for significantly improving environmental performance relative to other technologies, provide one of the effective steps for achieving the Sustainable Development Goals (SDGs). The grouping of emerging economies of Brazil, Russia, India, China and South Africa (BRICS) significantly contributes to greenhouse gas (GHG) emissions and climate change. Hence the BRICS countries have a great potential in mitigating GHG emissions. They can play a key role in the global climate change negotiations. Therefore, adoption of ESTs in these countries play a crucial role in mitigating climate change. In this context, this paper analyses the national laws and plans in BRICS countries pertinent to ESTs that can contribute in attaining the “stabilization of GHG concentrations in the atmosphere” (Article 2) objective of the United Nations Framework Convention on Climate Change (UNFCCC). The legal provisions for development, dissemination, and technology transfer commitments concerning ESTs in general and within the BRICS countries in particular are analyzed to understand the current position and future directions toward climate change mitigation.

**Keywords:** Environmentally sound technologies, green technologies, green policies, clean technologies, United Nations Framework Convention on Climate Change, BRICS, sustainable development goals

## 1. Introduction

Climate change is a major global issue, causing significant economic and environmental loss to humanity. It affects not only the prosperity and progress of any particular country but also the well-being of its people. The adoption of green technologies or environmentally sound technologies (ESTs) is a potential solution under the global regulatory framework for climate change.<sup>1</sup> The ESTs, which are also known as clean technologies or green technologies, are less harmful to our environment and help in mitigating climate change concerns.<sup>2</sup> ESTs are technologies capable of mitigating climate change and reducing greenhouse gases (GHG). Adopting ESTs with relatively improved environmental performance compared to existing technologies is an effective step for achieving the SDGs.

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- 1 Desai, Bharat H. (2023), *Regulating Global Climate Change: From Common Concern to Planetary Concern* (Amsterdam: IOS Press). Also see, Bodansky Daniel, Brunnee Jutta, Rajamani Lavanya (2017), *International Climate Change Law* (Oxford: Oxford University Press).
- 2 Chu M.W.W. Jonathan (2013), *Developing and Diffusing Green Technologies: The Impact of Intellectual Property Rights and their Justification*, 4 WASH. & LEE J. ENERGY, CLIMATE, & ENV'T 53 2013; available at- <https://law2.wlu.edu/deptimages/Journal%20of%20Energy,%20Climate,%20and%20the%20Environment/7-Chu.pdf>

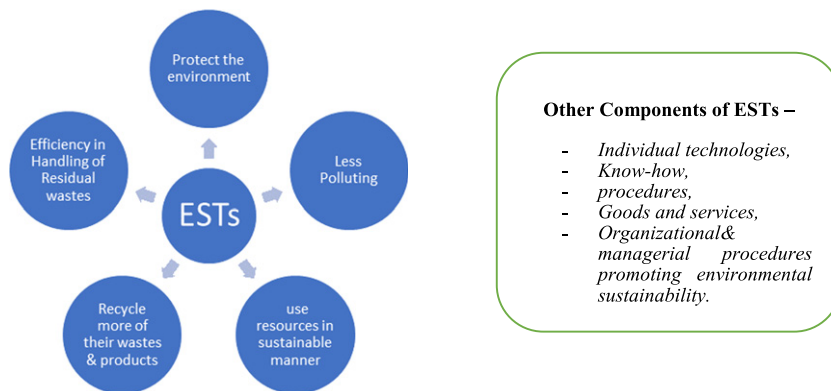


Fig. 1. ESTs and its components.

## 2. ESTs: Role and Significance

ESTs and their importance were first emphasized during the 1992 UN Conference on Environmental Development (UNCED; Rio Earth Summit), a key element of international environmental cooperation. Chapter 34 of Agenda 21, adopted at the UNCED, defined ESTs as the “technologies protecting the environment, which are less polluting, use resources in a sustainable manner, recycle more of their wastes and products, and handle all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes” (Fig. 1).<sup>3</sup> ESTs in relation to pollution include “process and product technologies that generate less or no waste, for the prevention of pollution. They also cover end-of-the-pipe technologies for the treatment of pollution after it has been generated.”<sup>4</sup>

ESTs role, importance, and relevance for sustainability cannot be denied or questioned. ESTs are considered global public goods and all countries are obliged to reduce the climate change concerns by using such technologies. Initially, developed countries such as US and EU, the major contributors to global emissions and top energy-consuming nations, were leading in EST development. As the major players in the market for climate change technologies, they are also obliged under international environmental agreements to help the developing and least developed countries. Though the developing nations are also major GHG emitters, they are placed after developed nations and depend on them for technology and other resources due to their limited capabilities. The role of developing countries in mitigating climate change issues at international climate negotiations is unquestionable.<sup>5</sup> The major emerging economies of the world, which are becoming more engaged with the global market and are on the way to transitioning into the developed economy, are also under pressure to reduce GHG emissions. For instance, the five major emerging economies of the world, *i.e.*, Brazil, Russia, India, China, and South Africa (BRICS), place great importance on climate change mitigation. The term BRIC was coined in 2001 by British economist Jim O’Neil, to highlight the investment potential of these countries.<sup>6</sup>

These developing emerging economies have an increasingly significant role in the international economy, geopolitics, and trade.<sup>7</sup> China, the second largest economy after the US, leads the group of emerging economies, followed by India and Brazil. BRICS is a significant group trying to bring together the major emerging economies of the world, comprising 41% of the world population, 24% of GDP, and over 16% share the world trade.<sup>8</sup> Around

3 UN (1992), *Transfer of environmentally sound technology, cooperation and capacity-building*, Agenda 21, chapter 34.1, United Nations Conference on Environment and Development; available at: Agenda21.doc (un.org).

4 *Ibid*, Agenda 21, chapter 34.2.

5 Carlarne P. Cinnamon, Gray R. Kevin, Tarasofsky G. Richard (2019), *The Oxford Handbook of Climate Change law*, (Oxford Press University).

6 Kiprizli, Goktug, and Seckin Kostem (2022). “Understanding the BRICS framing of climate change: The role of collective identity formation” *International Journal* 77.2 (2022): 270-291.

7 *Ibid*.

8 BRICS India (2021), *Evolution of BRICS*; available at: <https://brics2021.gov.in/about-brics>

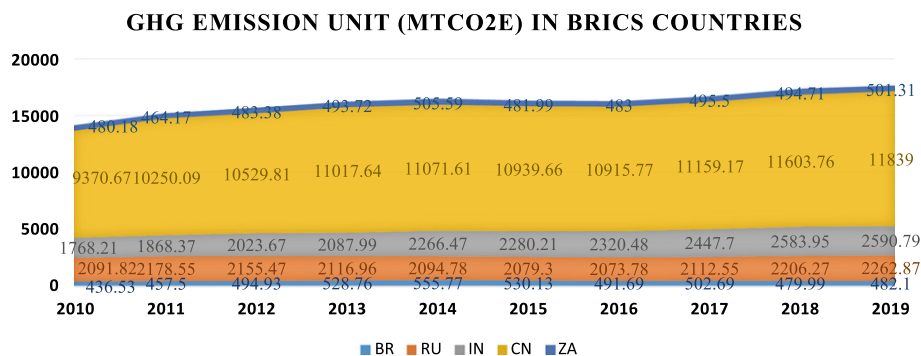


Fig. 2. GHG emission in BRICS countries. (Data Source: Data Explorer, Climate Watch, Compiled by author).

one-third of the world's food is produced by the BRICS countries.<sup>9</sup> BRICS countries determine active and influential participation in global governance along with their increased technological capabilities. The resource consumption in BRICS countries is growing resulting in a high contribution to GHG emissions. Figure 2 indicates the continuous and fast surge in the emission of GHG in BRICS in the last ten years i.e., from 2010 to 2019. Also, as per the recent study, China is the largest emitter of carbon dioxide on absolute basis and Russia is the largest GHG emitter per capita basis.<sup>10</sup> These data indicate how important it is for BRICS countries to have an active and imperative role in climate change mitigation. However, to achieve the sustainable goal, they seek supportive policies for technology and technical know-how transfer, structuring and building up economic, technical, and managerial capabilities for the efficient use and further development of transferred technology.<sup>11</sup>

Issues of environment and climate change are in the BRICS agenda since its inception. They have prioritized the actions on climate change mitigation as one of their fundamental areas of focus and are striving towards it. Along with developed countries, BRICS nations also reiterated their commitment to the importance of 2030 SDGs, which articulate international development priorities and global cooperation towards climate change by 2030.<sup>12</sup>

In this context, the current paper focuses on understanding the role of emerging economies specifically the BRICS nations in climate change mitigation from the perspective of the development and adoption of ESTs. This paper analyses the national laws and plans in BRICS countries pertinent to ESTs that can contribute in attaining the “stabilization of GHG concentrations in the atmosphere” as per the (Article 2) objective of the UNFCCC. For the purpose of understanding, the paper has been divided into three parts. In the first part of the paper, the authors have highlighted the provisions and commitments laid down by the international agreements towards developing and emerging countries. In the second part, the authors have analyzed how successfully BRICS nations have implemented those provisions in their respective legislations. Next, in the third part measures for cooperation and EST technology transfer among BRICS nations is analyzed in order to understand the capabilities of BRICS nation towards achieving the SDGs.

### 3. ESTs in MEAs

The development, promotion, and dissemination of ESTs have been an important part of several multilateral environmental agreements (MEAs)<sup>13</sup>. United Nations Framework Convention on Climate Change of 1992 (UNFCCC), the Kyoto Protocol of 2005, and the Paris Agreement of 2015 are three main instruments dealing

9 XIV BRICS Summit *Beijing Declaration*, 23 June 2022; available at- [https://www.fmprc.gov.cn/eng/zxxx\\_662805/202206/t20220623\\_10709037.html#:~:text=We%20commend%20China's%20Chairship%20for,Relations%20on%2019%20May%202022.](https://www.fmprc.gov.cn/eng/zxxx_662805/202206/t20220623_10709037.html#:~:text=We%20commend%20China's%20Chairship%20for,Relations%20on%2019%20May%202022.)

10 Center For Climate and Energy Solutions, *Global Emissions*; available at- [Global Emissions – Center for Climate and Energy Solutions](https://www.c2es.org/global-emissions/) (c2es.org)

11 Tripathi Mahima, Bhattacharya Sahoo Niharika (2022), Ed., *An Asian Perspective of Intellectual Property and Environmentally Sound Technology: Challenges and Opportunities. Comparative Law (Facets, Nuances and Intricacies)* (Thomson Reuters), at 526-543.

12 Gladun Elena (2016), “BRICS Countries Political and Legal Participation in the Global Climate Change Agenda”, *BRICS Law Journal*, 2016.

13 For a detailed study on MEAs, see Bharat H. Desai (2010, 2013), *Multilateral Environmental Agreements: Legal Status of the Secretariats* (New York: Cambridge University Press).

Table 1  
ESTs in three MEAs on Climate Change

MEAs – Climate Change	Objective laid down in the Agreement
UNFCCC, 1992	<i>“Stabilizing atmospheric concentration to prevent dangerous anthropogenic interference with the climate system.”</i>
Kyoto Protocol, 1997	<i>“Focused on adoption and reporting policies and measures on mitigation; “common but differentiated responsibility and respective capabilities” to operationalize the UNFCCC; obligating industrialized countries to limit and reduce GHG emissions.”</i>
Paris Agreement, 2015	<i>“To accelerate and intensify the actions and investments for a sustainable low, carbon future by increasing the ability of countries to deal with the impacts of climate change.”</i>

with climate change mitigation concerns and the development and dissemination of ESTs. Acknowledging the importance of ESTs, Chapter 34 of Agenda 21 highlights the need for the proper access and transfer of ESTs, particularly in developing countries. Table 1 summarizes the international agreements on ESTs with their respective objective laid down under the agreement.

In 1992, the Rio Earth Summit of UNFCCC was concluded to achieve the stabilization of GHG concentrations in the environment to prevent hazardous anthropogenic interference with the climate system. It was one of the foremost agreements that emphasized ESTs development and transfer. The UNFCCC works on the principle of *“common but differentiated responsibilities (CBDR), and encourages the dissemination of technologies amongst all Parties.”*<sup>14</sup> The Convention requested developed countries to take the initiative to promote, facilitate and finance the transfer and access of climate technologies to developing countries.<sup>15</sup> Though the commitments were declared by the Convention, but it places no legally binding requirements on the Parties.

After UNFCCC, the Kyoto Protocol was adopted in 1997, setting strict and lawfully binding emission reduction targets for the GHGs. It mandated developed and industrialized nations to reduce their GHG emission to 5% below 1990 levels between 2008 and 2012.<sup>16</sup> Under Article 10(c), it facilitated the transfer of ESTs wherein it mentions *“all Parties are to cooperate in the promotion of development, application, and diffusion of ESTs and to take all possible steps to promote, facilitate and finance the proper transfer or access of ESTs.”* Under this protocol in addition to the national measures, industrially developed countries are allowed to adopt three flexible market mechanisms namely clean development mechanism (CDM), joint implementation, and emission trading to reduce GHG emissions and encourage technology transfer. These mechanisms mainly promoted green investment and the adoption of ESTs or clean technologies.

In 2009, COP 15- the Copenhagen Climate Summit made an effort to negotiate for effective cooperation, including improvements to the CDM of the Kyoto Protocol and produced the Copenhagen Accord, clearly expressing the political intent to constrain GHG emissions through short and the long term measures.<sup>17</sup> Subsequently, in 2010, COP 16 made efforts toward multilateral action for promoting the needed action for climate change mitigation by creating Technological Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN) with fully operational technology mechanism to foster innovation.<sup>18</sup>

The above conventions and protocols though laid the commitments but they were not very successful. One major reason for that being non- binding on the parties. The principle of CBDR was another problem for the success of the conventions. This principle created a stiffness between developed and developing countries,

14 UNFCCC (1992), *United Nations Framework Convention on Climate Change*, Article 3.1; available at- [https://unfccc.int/files/essential\\_background/background\\_publications\\_htmlpdf/application/pdf/conveng.pdf](https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf)

15 Ibid, Article 4.5; available at- [https://unfccc.int/files/essential\\_background/background\\_publications\\_htmlpdf/application/pdf/conveng.pdf](https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf)

16 UNFCCC (2016), *A summary of the Kyoto Protocol*, United Nations Framework Convention on Climate Change (Aug. 1, 2016); available at-[https://unfccc.int/files/press/backgrounders/application/pdf/fact\\_sheet\\_the\\_kyoto\\_protocol.pdf](https://unfccc.int/files/press/backgrounders/application/pdf/fact_sheet_the_kyoto_protocol.pdf).

17 UNFCCC (2016), *Copenhagen Climate Change Conference (December 2009)* (Jul. 20, 2016). Available at- <https://unfccc.int/conference/copenhagen-climate-change-conference-december-2009>.

18 UNFCCC (2010), *Outcome of the work of the ad hoc working group on long-term cooperative action under the convention. United Nations Framework Convention on Climate Change*; available at- <https://unfccc.int/process/conferences/the-big-picture/milestones/the-cancun-agreements>

regarding the interpretation of the commitments, thereby making the issue of climate change mitigation more political.<sup>19</sup>

The Parties to UNFCCC reached a breakthrough agreement to combat climate change issues under the Paris Agreement of 2015, which emphasized on the acceleration of the actions and investments needed for a sustainable low, carbon future.<sup>20</sup> Paris Agreement was implemented to reflect the *fairness by underlying the principle of common but differentiated responsibilities and respective capabilities*, in the light of different national circumstances.<sup>21</sup> For the first time, Paris Agreement brought all the nations into a common cause to undertake determined efforts to fight climate change and suggested enhanced support to assist developing countries to do so. It also aimed to increase the capability of countries to deal with the effects of climate change through the provision of financial resources, technology transfer mechanisms, and enhanced capacity-building efforts.<sup>22</sup> It obligated the developed countries to support the efforts to develop climate-resilient technologies including ESTs through the technology framework for the effective development and dissemination of green technologies across member countries.<sup>23</sup> It introduced a new committing instrument of “*Intended Nationally Determined Contributions (INDC)*”, wherein Parties are required to prepare, communicate and maintain successive NDCs and communicate contributions every five years.

Though ESTs development, adoption, and transfer have been embraced significantly in many international documents their practical implementation is a big challenge due to their non-binding nature. The effective way to achieve the objectives, goals, or standards enumerated in these documents is by formulating supporting or collaborative National Laws and Policies by all the member countries. The purposes of international environmental documents should reflect in corresponding national laws as binding documents, which will help in achieving the stated objective. In this context, it is essential to study the laws and policies related to ESTs, particularly for the emerging economies as they are gradually contributing more towards the growing economy, thereby sharing equal responsibility as developed nations for attaining the SDGs.

#### 4. Role of BRICS in Climate Change Mitigation

The BRICS mechanism aims to promote peace, security, development, and cooperation. The BRICS partnership lies somewhere between the developing countries and the developed states but it is regarded as an aspirational rather than practical grouping in discussing their cooperation on climate change.<sup>24</sup> The national performance of the BRICS countries has deep implications at both the regional and global levels. They are able to influence the management of the world economy.<sup>25</sup> The arrival of BRICS as a substantive and substantial element in the global economic and political systems has attracted widespread interest and assessment.<sup>26</sup> Due to the rapid economic growth and high rates of energy consumption BRICS countries are among the top GHG emitters in the world and have a significant impact on climate change. Their collective identity is constituted by their existing affiliation with the larger coalition of countries and their status as emerging powers. And this collective identity has shaped the BRICS framing of climate change.<sup>27</sup> Climate change is a major challenge for all economies, but especially for developing and emerging economies that have greater vulnerability and risk exposure.

19 Devian K. Harri (2012), *The Politicization of Climate Change*, Thesis Georgia State University, 2012. DOI: <https://doi.org/10.57709/3476918>; available at: [https://scholarworks.gsu.edu/political\\_science\\_theses/49/](https://scholarworks.gsu.edu/political_science_theses/49/).

20 Birger Jon, Steinar Andresen, Bang Guri & Heggelund M. Gorild (2021), “The Paris Agreement and key actors’ domestic climate policy mixes: comparative patterns”, *International Environmental Agreements: Politics, Law and Economics* volume 21.

21 Paris Agreement, Art. 2, para. 2.

22 Paris Agreement, 2015, Article 6, United Nations

23 Paris Agreement, 2015, Article 10(5), United Nations.

24 Christian Brutsch and Mihaela Papa (2013), “Deconstructing the BRICS: Bargaining coalition, imagined community, or geopolitical fad?” *Chinese Journal of International Politics* 6, no. 3 : 299–327.

25 Streltsov, Aleksandrovich Rozhin, et al. (2021), “The economic potential of the BRICS countries as a challenge to modern world realities.” *Current context of education and psychology in Europe and Asia, May, 2021, Vol. 9, SPE(3), e1143*. DOI-<http://dx.doi.org/10.20511/pyr2021.v9nSPE3.1143>.

26 Gua, Renwickb, et al. (2018), “The BRICS and Africa’s search for green growth, clean energy and sustainable development”, *Energy Policy* 120 (2018) 675–683. DOI- <https://doi.org/10.1016/j.enpol.2018.05.028>

27 Kiprizli, Goktug, and Seckin Kostem (2022), n. 6.

At Copenhagen in 2009 (COP15), a group BASIC consisting of Brazil, South Africa, India, and China was formed to develop common negotiation positions in the UNFCCC to counter the pressure from developed countries.<sup>28</sup> Copenhagen was a critical juncture, as the discourse, ideas, and policy concepts of the BRICS underwent a fundamental change after the Conference. Just six months before COP 15, the BRIC leaders decided firmly and stated that they are ready for any constructive dialogue on how to deal with climate change mitigation on the principle of CBDR but would disregard any unilateral pressures from developed states.<sup>29</sup> After COP 15 BRICS countries unanimously acknowledged the importance and urgency of climate change mitigation and pledged to reduce GHG emissions. However, BRICS rejected the strict interpretation of the principle of CBDR that referred to the obligations imposed solely on developed countries. Rather, it presented similar policy-captivating voluntary pledges for emissions reductions, which is the implementation of common responsibilities complementing the principle of CBDR.<sup>30</sup>

In 2015, BRICS countries agreed to strengthen cooperation in the environmental issues concerning climate change mitigation and initiated many activities. A Working Group on Environment for identifying and discussing priority areas of cooperation, to facilitate the exchange of ESTs and their best practices was established. Also, BRICS Environmentally Sound Technology (BEST) platform was launched with the aim to facilitate an exchange of ESTs and to achieve SDGs. In 2015, “*New Development Bank (NDB)*” a multilateral development bank, headquartered in Shanghai, China, operated by BRICS countries was set up. The NDB focuses on a number of areas like sustainable urban development, economic development, transport infrastructure, and most importantly on clean energy. It was established with the purpose of mobilizing resources for infrastructure and sustainable development projects in BRICS as well as other emerging market economies.

In 2017, at the 9<sup>th</sup> BRICS summit held in China, a dialogue on the 2030 sustainable development agenda was held. Whereas in the 10<sup>th</sup> BRICS Summit convened in July 2018, these countries decided to strengthen their energy cooperation, pointing to their transition to more environmentally sustainable energy systems and supporting the global sustainable development agenda. BRICS countries expressed their willingness to continue work constructively with other Parties to conclude its related negotiations at the UNFCCC Katowice in December 2018. They reaffirmed their Paris Agreements commitment and urged developed countries to continue providing the support and help to the developing countries. BRICS nations reaffirmed that the transfer of needed technology is the most critical enabler for climate action. The 14<sup>th</sup> BRICS Summit in 2022, acknowledged the struggle of developing countries to recover from challenges like the COVID-19 pandemic crisis and achieve the SDGs. BRICS nations aimed jointly to address climate change and to accelerate the low-carbon and climate-resilient transitions.<sup>31</sup> Table 2 below highlights the BRICS summits meeting and their outcomes on climate change mitigation and ESTs from the year 2011-2022. As South Africa joined BRICS in 2010, after that only the first summit of all five economies took place in China in 2011.

Considering the active role of BRICS in climate change mitigation, it is important to understand what steps are taken by these countries at national level to achieve the objectives of UNFCCC and their NDCs. Therefore, in the next segment, the authors have analyzed the legal framework, policies, or plans laid down for the development and dissemination of ESTs toward climate change actions in each of the BRICS countries in consonance with the UNFCCC framework.

The discussion below seeks to analyse each BRICS member country’s policies and laws relevant to ESTs through the lenses of climate change action and their effectiveness.

#### 4.1. Brazil

Brazil is one of the first countries to sign and ratify the UNFCCC in 1994. Since then, it is fully committed to combat the adverse effects of climate change. In 2021, at COP 26, Brazil declared its new target of reducing GHG emissions by 50% by 2030, and increased mitigation ambition.

28 Sophie Anne, Lemoine Marion Willing Power (2012), “Fearing Responsibilities: BASIC in the Climate Negotiations,” *Carbon & Climate Law Review*, 2012 Vol.6, No. 3.

29 BRICS (2009), *Joint Statement of the BRIC Countries’ Leaders*, June 16, 2009; available at <http://www.brics.utoronto.ca/docs/090616-leaders.html>

30 Kiprizli, Goktug, and Seckin Kostem (2022), n.6.

31 Ministry of Foreign Affairs, China (2022), *Joint Statement issued at the BRICS High-level Meeting on Climate Change*, XIV BRICS Summit, 24 May 2022; available at: [http://brics2022.mfa.gov.cn/eng/hywj/ODMM/202205/t20220529\\_10694182.html](http://brics2022.mfa.gov.cn/eng/hywj/ODMM/202205/t20220529_10694182.html)

Table 2  
BRICS meetings and agreed outcomes 2011–2022

Meetings	Agreed outcomes
2011, BRICS Summit (China)	Considered climate change as one of the global threats challenging the livelihood of communities and countries. Acknowledged the importance of UNFCCC and Kyoto Protocol thereby enhancing practical cooperation in adapting our economy and society to climate change.”
2012 BRICS Summit (New Delhi, India)	Multilateral energy cooperation within the BRICS framework was a designated “New Area of Cooperation”. Pledged to increase their sourcing of clean and renewable energy, the use of energy-efficient and alternative technologies and respond to climate change. to exchange knowledge, know-how, technology, and best practices in ESTs.”
2013 BRICS Durban Summit (Durban)	“BRICS Multilateral Cooperation and Co-Financing Agreement for SDGs was created with the intention of focussing on bilateral, rather than multilateral, cooperation and co-financing agreements for green economic growth and development.”.
2015 Ufa Summit (Russia)	“Working group on the environment to identify priority areas of co-operation was established. Creation of NDB to fund environmental projects. BEST platform was introduced to share best environmental practices and facilitate the exchange of ESTs and know-how with the participation of public and private stakeholders.”
2017, Xiamen BRICS Summit (Xiamen)	“Strategic importance of clean and renewable energy which is “affordable to all”. Commitment to promote green development and low-carbon economy and enhance BRICS cooperation on climate change and expand green financing”.
2018, BRICS Summit (Johannesburg, South Africa)	“To strengthen their energy cooperation, for more environmentally sustainable energy systems and supporting the global SDGs agenda. Also expressed their readiness to continue work constructively with other Parties.”
2019, BRICS Summit (Brazil)	“Focused on economic growth for an innovative future. Innovation focusing to build economic stability for the development of ESTs.”
2020, BRICS Summit (Russia) (online)	“Emphasized on Partnership for Global Stability, Shared Security and Innovative Growth.”
2021, BRICS Summit (New Delhi, India) (online)	“Promoting innovative methods to attain sustainable development goals.”
2022, BRICS Summit (China)	“Addressed climate change concerns and to accelerate the low-carbon and climate-resilient transitions.”

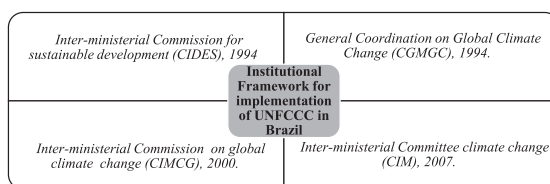


Fig. 3. Institutions established by Brazil for domestic implementation of laws and policies in consonance with UNFCCC.

To address the environmental issues and coordinate the domestic implementation according to UNFCCC, Brazil established several institutions and mechanisms as represented in Fig. 3.

As a first step a specialized body, the Inter-ministerial Commission for sustainable development (CIDES) was established by Presidential Decree No. 1160 in 1994, aiming to assist in making decisions about national strategies and SDGs policies in a manner compatible with Agenda 21 of UNFCCC.<sup>32</sup> By this decree, the Ministry of Science and Technology created General Coordination on Global Climate Change (CGMGC) in 1994 to coordinate the implementation of commitments under the UNFCCC. CGMGC participated in the negotiations on technical, scientific, and implementation issues discussed in the Subsidiary Body for Implementation (SBI) and

32 UNFCCC (2004), *Brazil's Initial National Communication to The United Nations Framework Convention on Climate Change*, General Coordination on Global Climate Change, Ministry of Science and Technology, Brasilia, November 2004; available at: <https://unfccc.int/resource/docs/natc/brazilinc1e.pdf>

Subsidiary Body for Scientific and Technological Advice (SBSTA).<sup>33</sup> The inter-ministerial commission on global climate change (CIMGC) of 2000 was established to coordinate discussions on climate change and integrate the government's policies into the ministries.<sup>34</sup> This body has the mandate to provide inputs on the government's involvement with the UNFCCC, setting criteria, and deciding CDM projects. In 2007, the Brazilian government began to reformulate its response to climate change which resulted in the formation of the National Plan on Climate Change. In line with that, the Inter-ministerial Committee climate change (CIM) was established by the Brazilian government to navigate the development, implementation, monitoring, and evaluation of the National Plan on Climate Change by supporting international coordination needed to undertake joint activities, technology transfer, and capacity-building. Its overall goal was to achieve sustainable economic and social development. Later the National Plan on Climate Change was updated after the consultation process ended in December 2014.

With the coordination of the above institutions, Brazil came up with specific Laws and Plans which aim to reduce GHG emissions. National Policy on Climate Change (PNMC) (Law of 12187), 2009 was the first instrument that provided a legal framework for regulating national actions to mitigate and adapt GHG and climate change. It enumerates various principles, guidelines, and instruments for attaining the national goal, providing a legal framework for preparing the National Adaptation Plan.<sup>35</sup> Under Article 4, PNMC's objective must be aligned with sustainable development to pursue economic growth, eradicate poverty and reduce social inequalities. Under Article 5, the commitments assumed by Brazil in the UNFCCC, in the Kyoto Protocol, and in other documents on climate change to which it is a signatory find a place.<sup>36</sup> The law also promotes international cooperation at the bilateral, regional, and multilateral levels for financing, training, development, transfer, and dissemination of technologies. Further, it facilitates processes for implementing mitigation and adaptation actions, including scientific research, observation, systematic and information exchange. In the same year, in 2009, the Brazilian government established National Climate Fund (FNMC) to finance its climate-related initiatives. The FNMC was capitalized through international grants and royalties paid to the government by companies involved in clean technology.<sup>37</sup>

Brazil is one of the first developing countries that has set a high emissions reduction target and emphasizes its willingness to do more in the context of an international environmental agreement over the years.<sup>38</sup> Recently, in 2021, a decree for the Inter-ministerial Committee on Climate Change and Green Growth was passed (Decree No. 10,845). It provided guidelines to articulate and coordinate the implementation of the country's public actions and policies related to climate change. It also aims to monitor the implementation of the NDC presented in the context of the Paris Agreement (Inter-ministerial Committee on Climate Change and Green Growth, 2021).<sup>39</sup> With the support of these policies and national action plans, Brazil is trying to achieve the set targets under NDC. The active role of Brazil in adopting measures for climate change is appreciable.

#### 4.2. Russia

Russia ratified UNFCCC in 1994 to tackle climate change concerns. As the latest signatory to Paris Agreement in 2019, Russia recently approved a long-term climate strategy focusing on net zero emissions by 2060 and an

33 Ibid.

34 Nachmany Michel, Fankhauser Sam et al. (2016), "Climate Change Legislation in Brazil" in *The 2015 Global Climate Legislation Study A Review of Climate Change Legislation in 99 Countries*; available at- <https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/BRAZIL.pdf>

35 Leslie Nielson (2009), "Climate Change Policy: Brazil, China, India and Russia", Parliament of Australia, *Parliament Library, February 25, 2009*; available at- [https://www.aph.gov.au/About\\_Parliament/Parliamentary\\_Departments/Parliamentary\\_Library/pubs/BN/0809/ClimateChange](https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BN/0809/ClimateChange)

36 Brazilian National Policy on Climate Change (2009), *Law of 12187*; available at: <https://www.brazilianr.com/brazilian-environmental-legislation/law-no-12187-brazilian-national-policy-on-climate-change/>

37 Ludena Carlos, Maria Netto (2011), 'Brazil: Mitigation and Adaptation to Climate Change,' *Theoretical framework for the elaboration of IDB's strategy in Brazil*.

38 *Executive Summary: National Plan on Climate Change: Brasilia*, at 14 (Jul. 20, 2016).

39 Inter-ministerial Committee on Climate Change and Green Growth (2021); available at- [http://www.planalto.gov.br/ccivil\\_03/\\_ato2019-2022/2021/Decreto/D10845.htm#art20](http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2021/Decreto/D10845.htm#art20)



80% reduction below 1990 levels by 2050.<sup>40</sup> In that context, Russia has come up with some specific Laws and Plans to achieve its target and objectives as per UNFCCC.

The first step by Russia to reduce GHG emissions was the “*Climate Doctrine of 2009*”, drafted within the UNFCCC framework, marked as a crucial step in Russia recognizing the potential benefits of mitigation measures. It sets out the basis for the formation of strategic guidelines and a foundation for the development and implementation of future climate policy.<sup>41</sup> The Doctrine is not binding but serves as a blueprint to harmonize domestic climate-related legislation with international standards and a strong statement of intent. At the same time, it focused on monitoring the climate, adopting more robust environmental standards and energy-efficiency measures to encourage the use of renewable energy sources.<sup>42</sup> After that in 2020, “*the National Action Plan for the First Phase of Adaptation to Climate Change*” was approved as the first stage of adaptation to climate change for the period up to 2022. It defined economic and social measures to be implemented by the state for achieving the UNFCCC objectives by institutional, organizational, and methodological measures aimed at forming state approaches to adaptation to climate change.<sup>43</sup> Recently, Russia has come up with the Federal Law on Limiting Greenhouse Gas Emissions for sustainable and balanced development of Russia while reducing GHG emissions.<sup>44</sup> It sets out the legal framework for mandatory reporting of carbon starting in 2023 for the utmost polluting companies and the carbon offsetting schemes. This law also focuses on international cooperation in limiting GHG emissions according to the norms and principles of international laws and treaties of the Russian Federation.<sup>45</sup> Though Russia signed Paris Agreement late, it is making efforts and taking measures to combat climate change concerns. However, it is too early to judge the effectiveness of the measures to achieve the target of carbon neutrality by 2060.

#### 4.3. India

India ratified UNFCCC on 1<sup>st</sup> November 1993. So far, India does not have any direct legislation dealing with the objectives of the UNFCCC, but it has National Action Plans incorporating the objectives and principles in consonance with the convention. The Energy Conservation Act, of 2001, which underwent an amendment in August 2022 can be indirectly related to climate change mitigation action, as it aims at the efficient use of energy and its conservation. The Bureau of Energy Efficiency (BEE) is established under section 3 of the Act to assist in developing policies and strategies with the primary objective of reducing the energy intensity of the Indian economy.<sup>46</sup>

Later in 2008, the National Action Plan on Climate Change (NAPCC) was passed by the Government of India in order to identify measures that promote the country’s development objectives and address climate change issues effectively. It provided a framework for the national strategy aiming to empower the country to adapt to climate change and enhance environmental sustainability.<sup>47</sup> One of the principles of NAPCC is to deploy appropriate technologies for both adaptation and mitigation of GHG. It emphasizes on international cooperation

40 Volodin, E.M. (2022), ‘Possible Climate Change in Russia in the 21st Century Based on the INM-CM5-0 Climate Model, *Russ. Meteorol. Hydrol.*, 2022, 47, 327–333. <https://doi.org/10.3103/S1068373922050016>.

41 Climate Doctrine of the Russian Federation, December 17, 2009.

42 Quentin Buckholz (2016), “Russia and Climate Change: A Looming Threat”, *The Diplomat*, February 4, 2016; available at <https://thediplomat.com/2016/02/russia-and-climate-change-a-looming-threat/>

43 National Action Plan for the First Phase of Adaptation to Climate Change (2020); available at <https://climate-laws.org/geographies/russia/policies/national-action-plan-for-the-first-phase-of-adaptation-to-climate-change-approved-by-order-of-december-25-2019-no-3183-r>

44 Federal Law No. 296-FZ On limiting greenhouse gas emissions, 2021. Available at <http://publication.pravo.gov.ru/Document/View/0001202107020031>

45 Ibid.

46 Michal Nachmany et al. (2016), “Climate Change Legislation in India” in *The 2015 Global Climate Legislation Study: A Review of Climate Change Legislation in 99 Countries*, July 25, 2016; available at <https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/INDIA.pdf>

47 Pew Centre on Global Climate Change (2008), *Climate Change Mitigation Measures in India*, International Brief 2, September 2008; available at <https://www.c2es.org/wp-content/uploads/2008/09/climate-change-mitigation-measures-india.pdf>

Table 3  
NAPCC Missions with their respective objectives

National Mission	Objectives
<i>National Solar Mission, 2010</i>	<i>Creating a policy for the diffusion of solar technology across the country to make India a global leader in solar energy."</i>
<i>National Mission for Enhanced Energy Efficiency, 2011</i>	<i>Strengthening the energy efficiency market by fashioning encouraging regulatory and policy regimes and developing innovative and sustainable business models for the energy efficiency sector."</i>
<i>"National Mission on Sustainable Habitat, 2010."</i>	<i>Developing overall sustainable habitat standards to address climate change-related concerns."</i>
<i>National Water Mission, 2011</i>	<i>Ensuring integrated water resource management for water conservation, minimizing wastage, and ensuring more equitable distribution across and within states."</i>
<i>"National Mission for Sustaining the Himalayan Eco-system, 2010"</i>	<i>Sets the goal of preventing melting of the Himalayan glaciers and to protect biodiversity in the Himalayan region."</i>
<i>National Mission for a Green India, 2014</i>	<i>Responding to climate change by combining adaptation and mitigation measures, enhancing carbon sinks in sustainably managed forests and other ecosystems."</i>
<i>"National Mission for Sustainable Agriculture, 2014."</i>	<i>Make agriculture more productive, sustainable, remunerative, and climate resilient by promoting location-specific integrated or composite farming systems."</i>
<i>"National Mission on Strategic Knowledge for Climate Change, 2008."</i>	<i>To build a vibrant and dynamic knowledge system that would inform and support national action for responding effectively to the objective of ecologically sustainable development."</i>

for research and development in the sector of climate-resilient technologies.<sup>48</sup> It also encourages the sharing, and technology transfer enabled by additional funding mechanisms. The highlight of the policy is the realization of a global Intellectual Property Rights (IPR) regime that facilitates technology transfer to developing countries under the UNFCCC.<sup>49</sup> NAPCC outlined a number of steps to simultaneously advance India's development and climate change-related adaptation and mitigation objectives. NAPCC has eight national missions representing long-term and integrated strategies for achieving key goals in the context of climate change.<sup>50</sup> Table 3 below highlights the eight missions under NAPCC highlighting their objectives to empower the country and tackle climate change concerns.

NAPCC, under its missions, addresses urgent environment-related needs by focusing on the development and enhancing the planned programs and technologies concerning significant climate change issues. These missions have short- and long-term goals based on priorities. Each mission is handled by the different ministries and time and again steps are being taken to reach the targeted goals set under each mission.<sup>51</sup> For instance, under National Solar Mission, the Ministry of New and Renewable Energy launched the Jawaharlal Nehru National Solar Mission in 2010 to achieve grid parity by 2022 and to increase the share of solar energy in India's energy mix by emphasizing solar panel manufacture and to make it affordable. In this way, designated ministries and departments set the target and try to keep the climatic and environmental needs in consonance with the UNFCCC.<sup>52</sup>

As a developing country, India requires financial aid for all climate and environmental initiatives. That is why in addition to the above eight missions, National Clean Energy Fund (NCEF), now termed National Clean Energy Environment Fund (NCEEF), is created through Finance Bill 2010-11 to promote and finance clean energy initiatives and green environment initiatives.<sup>53</sup> Green India Mission, Green Energy Corridor, Jawaharlal

48 National Action Plan on Climate Change, 2008. Available at- <http://www.nicra-icar.in/nicrarevised/images/Mission%20Documents/National-Action-Plan-on-Climate-Change.pdf>

49 Ibid.

50 Chopra, K. 'Climate Change Policy in India. In: Development and Environmental Policy in India,' *Springer Briefs in Economics, 2017, Springer, Singapore*. [https://doi.org/10.1007/978-981-10-3761-0\\_3](https://doi.org/10.1007/978-981-10-3761-0_3).

51 Pandve, Harshal (2009), "India's National Action Plan on Climate Change," *Indian Journal of Occupational and Environmental Medicine* 2009, 13. 17-9. 10.4103/0019-5278.50718.

52 Agarwal Swati, Pahuja Neha (2015), "Green Growth and Climate Change Mitigation in India," *TERI New Delhi, 2015*; available at: <https://www.teriin.org/projects/green/pdf/National-Mitigation.pdf>

53 Bhushan Gopalakrishnan (2021), "Environmental Laws and Climate Action: A case for enacting a framework climate legislation in India," *International Forum for Environment, Sustainability and Technology 2021, New Delhi*.

Nehru National Solar Mission installation of solar photovoltaic lights, etc., are some projects financed by NCEEF. Under NCEEF, the proposed project should cover 40% of its own cost; the rest is then covered by the fund.<sup>54</sup> In 2015, National Adaptation Fund for Climate Change (NAFCC) was formed to meet the cost of adaptation to climate change for union territories and states of India that are mainly vulnerable to the adverse effects of climate change, and the government allocated the budget for the same. NAFCC focuses to build climate resilience in the areas recognized under the State Action Plan on Climate Change and the pertinent Missions under NAPCC.<sup>55</sup>

After the NAPCC in 2015, the Climate Change Bill was introduced in the Lok Sabha, which is still pending, with the aim to set the targeted GHG reduction; establish National Committee on Climate Change; provide carbon trading and budgeting schemes and encourage other such activities to reduce GHG emissions. If this Bill is passed, it will be a comprehensive and direct piece of legislation dealing with climate change concerns.<sup>56</sup>

Recently, in 2021 at COP26 held at Glass Glow, the Prime Minister of India unveiled the five-fold strategy of 'Panchamrita' to achieve the NDC set in Paris Agreement. *Panchamrita's* promise includes that: (i) By 2030 India will get its non-fossil energy capacity to 500 GW; (ii) The country will meet 50% of its energy requirements from renewable energy; (iii) India will reduce the total projected carbon emissions by one billion tonnes; (iv) It will reduce the carbon intensity of its economy by less than 45%; (v) Also, India will target net zero emission by 2070.

India's strong efforts in strengthening the approaches for combating climate change are evidently witnessed through national policies and the NAPCC. Reduction in carbon emissions and SDGs can be achieved successfully by implementing the NDCs. Achievements toward these milestones will definitely be a big step toward climate change mitigation.

#### 4.4. China

China ratified the UNFCCC in 1993. Under the UNFCCC negotiations, China has always convincingly advocated for the principle of "common but differentiated responsibilities." China, one of the world's largest emitters of GHG, is under immense pressure to reduce its emissions.<sup>57</sup> Recently in October 2021, China released its NDC under the Paris Agreement, aiming "to peak CO<sub>2</sub> emissions before 2030, achieve carbon neutrality before 2060, and bring its total installed capacity of wind and solar power to over 1.2 billion kilowatts by 2030."<sup>58</sup> China too does not have any specific legislation which is directly in consonance with the UNFCCC, but it has come up with policies time and again to determine the GHG emissions for achieving convention objectives.

The first document in China for climate change and related issues was the 10<sup>th</sup> Five Year Plan (2001-2005), which addressed climate change and other global environmental concerns. Though, it contained several environmental targets but none of those directly dealt with climate change or energy efficiency. So, this Plan was not very effective for climate change issues.<sup>59</sup> Later in 2007, China's Energy Conservation Law aimed "to strengthen energy conservation for energy-using entities to promote efficient energy use and adoption of energy conservation technology." In the same year, the National Climate Change Programme (NCCP) was issued by the National Development and Reform Commission (NDRC), which is *China's first global warming policy initiative*. Through the NCCP the government adopted legal, administrative and economical measures, which helped to reduce the GHG emission. The program focused on agriculture, forestry, waste and energy

54 Sarangi, G. K. (2018), "Green Energy Finance in India: Challenges and Solutions," *ADB Working Paper 863*. Tokyo: Asian Development Bank Institute 2018.; available at: <https://www.adb.org/sites/default/files/publication/446536/adb-wp863.pdf>

55 NABARD, *NAFCC Portfolio Highlights in India*, Ministry of Environment Forest and Climate Change; available at: [nafcc-portfolio-highlights.pdf](http://nafcc-portfolio-highlights.pdf) (nabard.org)

56 Climate Change Bill, 2015; available at <http://164.100.47.4/billtexts/lsbilltexts/asintroduced/4367LS.pdf>

57 Sternfeld Eva (2017), *Routledge Handbook of Environmental Policy in China*, Taylor & Francis, 2017.

58 UNFCCC (2021), *China's Achievements: New Goals and New Measures for Nationally Determined Contributions*, 28 October 2021. Available at <https://unfccc.int/sites/default/files/NDC/2022-06/China's%20Achievements%2C%20New%20Goals%20and%20New%20Measures%20for%20Nationally%20Determined%20Contributions.pdf>.

59 *Report on the Outline of the Tenth Five-Year Plan for National Economic and Social Development (2001)* China National People's Congress. Available at - [http://www.npc.gov.cn/zgrdw/englishnpc/Special\\_11\\_5/2010-03/03/content\\_1690620.htm](http://www.npc.gov.cn/zgrdw/englishnpc/Special_11_5/2010-03/03/content_1690620.htm).

production, and its uses. Later, in the 11<sup>th</sup> Five-Year Plan (2006–2010) a binding target for energy efficiency was introduced.<sup>60</sup>

In 2013 NDRC published “*The National Strategy for Climate Change Adaptation.*” It laid out principles and guidelines for adaptation of climate change and proposed some explicit adaptation goals, outlining the measures to be implemented by 2020 to cover all aspects resulting in lowering the GHG emissions. The 12<sup>th</sup> Five-Year Plan (2011–2015) was the first document to include climate change targets clearly. It had a chapter on climate change, wherein the State Council released a Work Plan for Controlling GHG Emissions during that period. The Plan included carbon intensity goals setting China on the path to meeting its UNFCCC submission. Recently, the 14<sup>th</sup> Five-Year Plan (2021–2025) laid the strategy and pathway for China’s development for 2021–2025, comprising concrete environmental and efficiency targets by focusing on technological and innovation capabilities of enterprisers. It is China’s blueprint for a new journey towards a socialist modern country. This Plan seems to be very comprehensive as it determines China’s strategic intentions, government priorities, and guides market participants in their activities in the concerned field.

China has been implementing proactive national strategies for addressing climate change. Through these Plans, China not only tried to structure its technical, institutional, and societal capacity to deal with climate change concerns and achieve the UNFCCC objectives and the targets set under the Paris Agreement but also recognized the opportunities to grow ESTs.<sup>61</sup> It has put forward its Global Development Initiative to accelerate the 2030 Agenda for SDGs, taking green development and climate change as one of its priority cooperation areas. China has made substantial progress in its domestic innovation and has established two foremost institutions, namely China Council for International Cooperation on the Environment and Development (CCICED) and the National Coordination Committee on Climate Change (NCCCC) to deal with climate change. These institutions are under the government and have to report to a high-level representative involved in central policy-making thereby helping country achieve carbon neutrality before 2060.<sup>62</sup> Supportive appropriate national policies and actions would lead to reduce GHG emissions and achieve the NDCs targets set by the country.

#### 4.5. South Africa

South Africa ratified UNFCCC in 1997. It is also no less than other BRIC countries in fulfilling the UNFCCC objectives. In September 2021, South Africa also released its latest national climate commitment under the Paris Agreement, “*intending to limit GHG emissions to 398-510 MtCO<sub>2</sub>e by 2025 and 350-420 MtCO<sub>2</sub>e by 2030, significantly lower than targets communicated in 2016.*”<sup>63</sup> National climate change governance in South Africa is the result of more than two decades of policy evolution and has been fashioned by the detailed landscape of policies, regulations, institutions, and strategies. National Climate Change Response Strategy, 2004 followed by the National Climate Change Response White Paper (NCCRWP), 2011 form the foundation of national climate policy.<sup>64</sup> Climate change in 2012 became a main component of the National Development Plan, the predominant Plan for the country.<sup>65</sup> South Africa, under UNFCCC, is required to provide the agreed data in the emission inventory and submit periodic national communications to its secretariat. The National Climate

60 Ibid.

61 King David, Cole Megan et al. (2012), “The Response of China, India and Brazil to Climate Change A perspective for South Africa,” *Smith School of Enterprise and the Environment University of Oxford*, 8 June 2012.

62 Heggelund Gorild, ‘China’s climate and energy policy: at a turning point?’, *International Environment Agreements*, 2021. Available at- <https://link.springer.com/content/pdf/10.1007/s10784-021-09528-5.pdf>

63 South Africa First Nationally Determined Contribution Under the Paris Agreement, 2021. Available at- <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/South%20Africa%20First/South%20Africa%20updated%20first%20NDC%20September%202021.pdf>

64 Kranz, N., Honke, J. (2013), “Environmental Policy in South Africa” in: Börzel, T.A. Thauer, C.R., Eds. (2013), *Business and Governance in South Africa*, Governance and Limited Statehood Series 2013. Palgrave Macmillan, London; available at: Environmental Policy in South Africa | SpringerLink

65 Averchenkova Alina, Kate Elizabeth Kate, and Curran Patrick (2019), “Governance of climate change policy: A case study of South Africa,” *Policy report June 2019*, Grantham Research Institute on Climate Change and the Environment and the Centre for Climate Change Economics and Policy; available at: [https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2019/06/GRI\\_Governance-of-climate-change-policy\\_SA-case-study\\_policy-report\\_40pp.pdf](https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2019/06/GRI_Governance-of-climate-change-policy_SA-case-study_policy-report_40pp.pdf)

Change Response Strategy, 2004 provides that the measures must be consistent with the national development and government priorities.

The National Climate Change Response Policy of 2011 of South Africa is one of the comprehensive plans to address short, medium, and long-term plans up to 2050 for climate change mitigation and adaptation. It encourages the promotion and cooperation in the development, application, diffusion, and transfer of GHG emission mitigation technologies, practices, and processes. Its Response strategy also includes technology research, development, and innovation. The Policy proposes a carbon budget approach to set emission reduction outcomes for all significant sectors, the best available mitigation options, and a full assessment of the costs and benefits. In 2020, South Africa's National Climate Change Adaptation Strategy was passed to serve its National Adaptation Plan and fulfils South Africa's commitment to its international obligations as outlined in the Paris Agreement under the UNFCCC.<sup>66</sup> It provides a common vision of climate change adaptation and climate resilience for the country and outlines priority areas for achieving the targets. Its main objective is "to guide all levels of government, sectors, and stakeholders affected by climate variability and change." This strategy Plan sets out the complete objectives, interventions, and outcomes with associated actions under UNFCCC.<sup>67</sup>

Recently *Climate Change Bill 2022* has been introduced and is still pending in the parliament. The main objective of the proposed Act is "to provide for a coordinated and integrated response by the economy and society to climate change, and also to provide for the effective management of inevitable climate change impacts by enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change by giving effect to the countries international obligations in relation to the climate change."<sup>68</sup>

South Africa is making steady progress on its climate goals. It updated a significantly more ambitious NDC submitted ahead of COP26 targeting to bring its net GHG emissions below the target. By developing detailed plans to enable a just transition to a low-carbon economy and climate-resilient society it is progressing ahead to achieve the set targets.<sup>69</sup>

Based on the above discussion, it is evident that all these economies are very much vigilant at international commitments on climate change, and for that, they are trying hard to strive in consonance with UNFCCC commitments. Among all the BRICS countries, Brazil, India, and China are showing remarkable growth by coming up with relevant laws and Policies, focusing on reducing GHG emissions, sector-wise targets and focusing on the development and dissemination of ESTs in all possible fields. Though Russian climate policy is emerging at a slower pace, significant progress has been achieved in the past few years. While Brazil and Russia have proper federal law in direct consonance with UNFCCC, South Africa is on the way to get its Climate Change Act and India and China have the Energy Conservation Act indirectly dealing with the objectives of the UNFCCC. India's Climate Change Bill of 2015 which is pending since last 7 years, will be a major facilitator if passed. Though different legal and policy frameworks are available in BRICS countries to reduce the climate change concerns, it is felt that a holistic approach in the framework is missing.<sup>70</sup> A timeline analysis of the relevant green policies in the BRICS countries suggests that the incoherency in the green target setting, green financing schemes, and implementation plans through technology mechanisms or action plans might be the reason for not-so-successful target achievement. Though the implementation of green policies and realization of the stated goals of policies is a long-term process, a strategic action plan with a strict implementation model is needed for these developing nations to meet the SDGs.

66 Republic of South Africa (2019), National Climate Change Adaptation Strategy; available at [https://www.dffe.gov.za/sites/default/files/docs/nationalclimatechange\\_adaptationstrategy\\_ue10november2019.pdf](https://www.dffe.gov.za/sites/default/files/docs/nationalclimatechange_adaptationstrategy_ue10november2019.pdf)

67 Ibid.

68 Republic of South Africa (2022), *Climate Change Bill 2021*; available at [https://www.parliament.gov.za/storage/app/media/Bills/2022/B9\\_2022\\_Climate\\_Change\\_Bill/B9\\_2022\\_Climate\\_Change\\_Bill.pdf](https://www.parliament.gov.za/storage/app/media/Bills/2022/B9_2022_Climate_Change_Bill/B9_2022_Climate_Change_Bill.pdf)

69 Ministry of Foreign Affairs, China (2022), n.30

70 Rahman Nayyer Mohd (2018), "Climate Change Issues in BRICS Countries," *Management & Economics Research Journal, January 2018*; available at <https://www.researchgate.net/publication/330207761>

## 5. EST Transfer in BRICS Countries

The importance of technology transfer mechanisms has been emphasized in all the international agreements on climate change and it has also created mechanisms to deal with technology transfer.<sup>71</sup> The Intergovernmental Panel on Climate Change (IPCC) defines technology transfer as “*a set of processes covering the flows of know-how, experience, and equipment for mitigating and adapting to climate change amongst different stakeholders be it governments, private sector, financial institutions, NGOs and research or education institutions.*” Among the BRICS member countries only Brazil’s Legislation titled National Policy on Climate Change, makes a special mention of technology transfer-related aspects involved in ESTs, whereas other countries have talked about the transfer of ESTs in their respective national action plans. The bilateral or multilateral agreements are favored as effective instruments for EST transfer among BRICS countries.

### 5.1. Mechanisms to encourage Technology Transfer under BRICS Forum

BRICS cooperation is intended to enhance and strengthen existing bilateral and multilateral relations among member countries.<sup>72</sup> BRICS countries reiterate the commitment to the importance of the 2030 Agenda for SDGs. The means and mechanisms in the implementation of SDGs are of critical importance and the BRICS countries also called for early implementation of the Global commitments towards Technology Facilitation Mechanism and Financing for the development. The first three meetings hosted by Environment Ministers of BRICS countries, namely Russia, India, and China, respectively included “*development with the implementation of the ESTs Platform, Clean Rivers Umbrella Programme, and the Partnership for Urban Environment Sustainability Initiative and undertook to continue to implement these initiatives.*”

In April 2015, BRICS Environment Ministerial Meet led to the formation of the BEST (BRICS Environmentally Sound Technology) platform to identify and deliberate main areas of cooperation, sharing best environmental practices amongst BRICS countries, and facilitating the exchange of ESTs, and their know-how with the involvement of public and private stakeholders in BRICS countries.<sup>73</sup> It is projected to be a practical and outcome-orientated platform, including partners from scientific organizations, financial institutions, and the private sector. However, since 2015 no major initiative has been taken under this platform. Later in the 6<sup>th</sup> BRICS Environment Ministers Meeting in 2020, the fundamental status of the BEST Platform was once again debated, wherein the importance was felt to develop existing areas within the BEST Platform, where the exchange of experience and best practices in the legislative regulation in the field of environmental protection and climate change could take place on regular basis among the BRICS member countries.<sup>74</sup>

In 2017, the BRICS Working Group on Science, Technology, and Innovation Entrepreneurship Partnership (STIEP) was established to implement the BRICS Action Plan for Innovation Cooperation (2017-20) which also included an open web-based platforms enabling cross-country market, collaborations, partnership and capital flow to achieve SDGs among BRICS countries.<sup>75</sup> Further, in 2018 an MOU was signed between BRICS countries on environmental cooperation to facilitate the exchange of technologies and best practices.<sup>76</sup> In this way many initiatives have been taken under the umbrella of BRICS, the success of those measures is yet to be studied.

71 Uddin Mahatab (2011), “Climate Change and Requirement of Transfer of Environmentally Sound Technology,” *Institutionen for Geovetenskap*, 2011, Uppsala, Sweden.

72 <http://brics-sti.org/index.php?p=about>

73 BRICS Information Centre (2015), *Statement: First Official Meeting of BRICS Environment Ministers*, Moscow, April 22, 2015; available at- <http://www.brics.utoronto.ca/docs/150422-environment.html>

74 BRICS, *Statement of the 6<sup>th</sup> BRICS Environment Ministers Meeting*, 30 July 2020, Moscow; available at: <https://cms.pib.gov.in/WriteReadData/userfiles/Final%20Statement%20BRICS.pdf>

75 BRICS India (2021), *Proposed Action Plan 2021-24*, Working Group on Science, Technology, Innovation and Entrepreneurship Partnership; available at- <https://brics2021.gov.in/brics/public/uploads/docpdf/getdocu-67.pdf>.

76 BRICS India (2021), *STI Framework Program*; available at: <https://brics2021.gov.in/environment>

Table 4  
Bilateral agreements between BRICS countries

Participating countries	Purpose
<i>India and China (2009 and 2010).</i> <i>India and China (2015).</i>	<i>For cooperation on addressing climate change and green technologies.</i> <i>To work according UNFCCC, particularly relating to the principles of “equity and common but differentiated responsibilities and respective capabilities”.</i>
<i>India and Brazil (2019).</i>	<i>On Bio energy, to share information on vehicular performance for GHG emissions reduction and improving the environment.</i>
<i>India and Russia (2019).</i>	<i>“On cooperation in research and logistics in the Antarctic, between the National Centre for Polar and Ocean Research (NCPOR) and the Arctic and Antarctic Research Institute of Roshydromet (AARI).”</i>
<i>BEE India and Russian Energy Agency (REA) (Russia) (2020).</i> <i>Brazil and India (2022).</i>	<i>To promote cooperation in the area of energy efficiency.</i> <i>For the promotion of ethanol and its blends in the automotive sector.</i>

### 5.2. Technology transfer through bilateral agreement within BRICS

Bilateral partnership on climate change is beneficial jointly and contributes to international efforts to address climate change concerns. The bilateral partners work together to attain a balanced, equitable, comprehensive, and effective agreement. The bilateral partnership may vary from country to country depending upon various factors, be it the geographical condition, population, availability of human resources, etc. The most important factor in this line can be to achieve the set targets for the country to become net zero emission. Therefore, the countries also prefer bilateral agreements so that the same remedy for the same problem can be shared. Some of the leading examples where BRICS countries have entered into a bilateral agreement among themselves are discussed in Table 4.

However, there are certain international instruments through which the technology transfer can be promoted among different nations including BRICS.

### 5.3. Technology transfer provisions for ESTs under the climate change regime

The Kyoto Protocol failed to achieve its goal though it provided the methods for technology transfer, but it did not give the proper mechanism as to how it can be initiated and implemented by the Parties.<sup>77</sup> However, the TRIPs Agreement, which sets the minimum IP protection standards has a significant role in developing and transferring ESTs and settling disputes between WTO members. The TRIPs Agreement does not define or incorporate the term ESTs as such but it deals with the technological inventions, development, and advancements in all fields and such provisions can be associated with ESTs too. Article 7 and 8 of the TRIPs dealing with the objective and principles respectively, talks about the transfer and dissemination of technology and to prevent the practices which unreasonably restrain trade or adversely affect international technology transfer. Environmental Protection, particularly in climate change mitigation is within the scope of public interest under Article 7,8 of the TRIPs. Also, Article 66.2 incorporates the duties of member countries and provides a special place for the least-developed countries and mandates *developed countries to help in promoting and encouraging technology transfer to least-developed country Members to enable them to create a sound and viable technological base.*

Interestingly, to facilitate the technology transfers for ESTs globally, the World Intellectual Property Organization (WIPO) has taken remarkable initiatives. Green Tech Database, WIPO Green, WIPO Match, etc., are prominent names in this line. These portals are the information centre for the development of ESTs. They help in giving information regarding the development of ESTs and serve as the marketplace for developed technology. These portals contain a cross-domain database to provide empirical evidence about the global evolution and distribution of ESTs.

77 Zhou, C. (2013), *The legal barriers to technology transfer under the UN Framework Convention on climate change: The example of China* (Doctoral Thesis), Tilburg University; available at: Zhou\_legal\_30-01-2013.pdf (uvvt.nl)

## 6. Conclusion

BRICS countries importance and role in climate change mitigation is very significant. Several global climate change processes and instruments such as the Copenhagen Accord, Paris Agreement, etc. have reinforced the collective identity of BRICS. Hence, the collective role of BRICS as an emerging power grouping has somehow shaped their policy perspectives and ideas as well as restructured their discourse especially in addressing the challenge of climate change. BRICS countries too have acknowledged this and, in turn, identified their priority areas in the domain of climate and energy. Among BRICS nations, China is far ahead in clean technology development and implementation. It can be emulated by other BRICS countries. The grouping can also incorporate appropriate domestic policy, comprehensive specialized legislation for GHG mitigation<sup>78</sup> and institutional measures concerning climate change. Though there are many references available internationally regarding green innovation, the lack of explicit direction of technology transfer and inefficiency of specific enforcement procedures in those instruments remain the major stumbling blocks.

In view of the nature of the BRICS grouping and the emerging trajectory of their environmental concerns, the bilateral relationships between members could help to shape global climate governance agendas. It could provide a basis for coordinated BRICS action in areas of energy efficiency, climate change, sustainable growth, clean energy, etc. Though BRICS countries have multiple identities in global politics that changes as per their geopolitical and economic priorities, as the working pattern and practice shows, these countries are capable enough in sidelining geopolitical differences and bilateral disputes in order to act collectively on some of their common concerns including international environmental governance (IEG)<sup>79</sup> especially on the climate change issue. Therefore, BRICS countries are expected to show more surge and cooperation in addressing them. A combination of governmental incentives, a comprehensive policy and legal framework as well as voluntary actions will be required in the coming years to harness goals of green policies comprising ESTs and other relevant measures.

78 For instance, an Indian scholar, Bharat H. Desai, has mooted the idea for a comprehensive legislation addressing the specific issue of GHG emissions mitigation. As explained by Desai, there is a need for a “comprehensive legislation with the primary aim of regulating and limiting GHG emissions in various sectors of the economy. With the NEP and NAPCC firmly in place, the stage is probably set for putting a special legislation in place... This legislation could include some indicative targets and time-frames, explicitly keeping socio-economic and developmental requirements in view. To implement the GHG regulations in an efficient manner, there is a need to strengthen the present institutional infrastructure. In this regard, an independent and autonomous GHG regulatory board could be needed at both the national and state levels. The GHG regulatory body could be empowered to enforce and implement the rules governing GHG emissions in the country”, see Desai, Bharat H. (2013), “India: Greenhouse Gas Mitigation”, *Environmental Policy and Law*, 43 (4–5) 238-252 at 245 and 249; available at: Environmental Policy and Law – Volume 43, issue 4-5 – Journals – IOS Press.

79 For a detailed exposition on the global scholarly discourse on IEG, see Desai, Bharat H. (2014), *International Environmental Governance: Towards UNEPO* (Boston and Leiden: Brill Nijhoff); available at: International Environmental Governance – Towards UNEPO | Brill